

REMARKS - General

By the above amendment, applicant has amended the title to emphasize the novelty of the invention.

Applicant has rewritten all of the claims from 22-43 to define the invention more particularly and distinctly so as to overcome the technical objections and rejections and define the invention patentably over the prior art references.

The Rejection of Claims 1-3, 11-12, and 16-17 on Monroe (US Patent, US-6,246,320) Under 35 USC 102(b) and The Rejection Claims 18-21 on Monroe (US Patent, US-6,246,320) in view of Breed (US Patent, US-6,919,803) Under 35 USC 103(a) Are Overcome

The office action rejected (1) independent claim 1 and dependent claims 2-3, independent claim 11 and dependent claim 12, independent claim 16 and dependent claim 17 on the patents of Monroe; and (2) dependent claims 18-21 on the patents of Monroe and Breed.

The independent claim 1 has been rewritten as a new independent claim 22 and the dependent claims 2-3 have been rewritten as new dependent claims 23-24. The independent claim 11 has been rewritten as new an independent claim 32 and the dependent claim 12 has been rewritten as a new dependent claim 33.

The independent claim 16, and the dependent claims of 17 and 18-21 have been canceled. All of the new claims from 22 to 43 are to emphasize the novelty of the invention and to define patentably over these prior-art references, and/or any combination thereof. Applicant requests reconsideration of these rejections, as now applicable to the new independent claim 22 and the new dependent claims from 23 to 31, the new independent claim 32 and the new dependent claims from 33 to 35, and the new independent 36 and the new dependent claims 37 to 43 for the following reasons:

- (1) There are no justification, in Monroe, or in any other prior art separate from applicant's disclosure, which suggests that these references be individual or be combination way in the manner proposed.

- (2) Even if Monroe and Breed were to be combined in the manner proposed, the proposed combination would not show all the novel physical feature of claims 22, 32 and 36.
- (3) These novel physical features of the new independent claim 22 and the new dependent claims 23-31, the new independent claim 32 and the new dependent claims 33-35, and the new independent claim 36 and the new dependent claims 37-43 produce new and unexpected results in such a way that proposed multiple-input multiple-output wireless sensor networks communication system completely operates in the different methods and deals with the different signals in the different situations that Monroe and Breed or any other prior art suggested, and therefore are novelty, unobvious and patentable over these prior-art references.

The Objection To The Claims Rejection

The claims 4-10 and 13-15 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent from including all of the limitations of the base claim and any intervening claims.

Applicant has rewritten the claims 4-10 into new claims 25-31 and the claims 13-15 into new claims 33-35 to provide sufficient antecedent basis for the limitation and intervening claims. Accordingly, applicant submits that the new claims 25-31 and 33-35 do comply with the suggestions and therefore requests reconsideration and withdrawal of this objection.

The References And Differences Of The Present Invention Thereover

Prior to discussing the claims and the above three points, applicant will first discuss the prior-art references and the general novelty of the present invention and its unobviousness over these prior-art references.

Present Invention - The present invention is a next-generation multiple-input multiple-output (MIMO) wireless sensor networks communication. It is envisioned to contain a

large number of sensor nodes, each capable of some limited computation, communication and sensing capabilities, operating in an unattended mode with limited energy, but having a sunlight solar cell power receiver to support power generation. Each of the sensor nodes can be made in a cost-effective and tiny form with energy-efficient and processing capabilities. It is also equipped with a sensor multifunction in which detects via electrical/electromagnetic fields, acoustics, optical, movement, chemicals, biological agents, radiation, environmental factors such as humidity, temperature, and so on. It can be embedded or may be independent of its surroundings.

Note that the present invention of the MIMO wireless sensor networks communication is not only responsible for frequency selection, carrier frequency generation, interleaver, error coding, channel estimate, signal detection, modulation, and source data encryption as well as strategies that overcome signal multipath propagation effects, but also responsible for architecture schemes including tiny, low-power, low-cost communication transceiver, sensing, A/D and D/A converters, and computing processing units and low power-efficient methods. In addition, the present invention of the MIMO sensor networks communication transceiver system simultaneously utilizes multiple antennas on both transmitter and receiver by processing signal samples both in space and time, thereby increasing array gain, spatial and temporal diversity, improving average signal power, mitigate fading, and reducing CCI and ISI. As a result, the present invention significantly improves the capacity, coverage, and quality of wireless sensor networks communication. Furthermore, the present invention uses adaptive novel communication signal processing approaches of space-time processing along with

MIMO-based multi-sensor code division multiple access (CDMA) architecture to provide capabilities for anti-jam resistant in a hostile and militarily sensitive or a battlefield.

Therefore, the present invention of the next-generation MIMO wireless sensor networks communication can be used not only in commercialization but also in military battlefield.

Monroe presented a ground link with on-board security surveillance system for aircraft and other commercial vehicles. The ground link with on-board security surveillance system is used to monitor between the ground and the transport, between the transport and ground or terminal support vehicles and to track collision avoidance as well as navigational information for flight plans. Monroe presented a sensor array unit (800, Figs. 1 and 2; 29, Fig. 4a, 5a, and 6a; 115, Fig 15; 300, Fig 16), which is built based on camera and temperature sensors, separately. It is clear that these sensors are not multimode sensors. Monroe also presented a multiple antenna unit (82, 282, Fig. 15; 512, Fig. 6a), which is a single antenna, one for aircraft and another one for LAN transceiver, respectively. It is clear that this is not MIMO antenna in which contains N antennas on one single device. Monroe presented a power unit, which is a DC power (322, Fig. 16). It is clear that this is not a solar cell power receiver, which can generate power by accepting sunlight. Monroe presented a transmitter and receiver (14, Fig. 4a; 314, Fig. 6a; 580, Fig. 6b), which mainly use a single antenna. Thus, it is clear that this is not a MIMO-based space-time transceiver. This is because using of single antenna is not able to perform MIMO-based space-time processing.

Also note that Monroe presented a multiple antenna unit (83, Fig 11), which is a single antenna. This is to say that it is not a MIMO antenna unit. Monroe presented a controller (85, Fig. 11), an operation control center (220, Fig. 18), and a security center (222, Fig. 18). It can be seen that all of the functions (85, 220, 222) are either not a space-time processor or not a space-time Rake processor. Referred to col. 16, lines 1-10, there are not a MIMO channel estimation, and a pseudorandom sequence generator. This is because Monroe does not have CDMA architecture in the system. Also referred to the col. 16, lines 1-10, there is not a training sequence, which is a sequence of data transmitted from a transmitter to receiver. Thus, it is clear that Monroe does not use the training

sequence for the MIMO channel estimation. In addition, Monroe presented a power unit coupled to a power generator and a power saving mode of operation (col. 14, lines 48-67) to conserve power. It even does not mention any other power operations such as wake-up, full operation mode, partial operation mode, and so on. It is also clear that Monroe does not have a solar cell power receiver in which receive sunlight to generate power automatically.

Therefore, the applicant's invention of using the next-generation MIMO wireless sensor networks communication is completely different from what **Monroe** used the sensor unit, transceiver, power generator unit, antenna unit, processor, channel estimation, training sequence, and power saving mode for operation.

Breed presented a low power remote asset monitoring that is used to monitor transportation assets, such as shipping containers, interior or exterior environment, with a lower power requirement without needing maintenance. **Breed** introduced a "sleep" mode and a wake-up mode, which can be achieved when the airbag fires and the microphone emits a current or by a piezo-generator based on movement, or by a clock or by the reception of a proper code from an antenna (col. 27, lines 1-15) in a telematics service such as OnStar for automobile owners.

Note that applicant's invention presents the MIMO antenna-based wireless sensor networks communication, which is expected to utilize a larger of size sensor nodes, such as 1000, or even more individual sensor nodes in potentially hostile and militarily sensitive environments. The present invention of the MIMO-based wireless sensor networks communication is used to frequency selection, carrier frequency generation, interleaver, error coding, channel estimate, signal detection, modulation, and source data encryption and methods that overcome signal multipath propagation effects. The present invention of the MIMO-based wireless sensor networks communication also has architecture schemes of tiny, low-power, low-cost communication transceiver, sensing, A/D and D/A converters, computing processing units and low power-efficient operation modes. The low power-efficient operation modes include: full operation mode, sleep mode, wake-up mode, and partial operation mode, which are controlled by using software

program. All of the low power-efficient operation modes are particularly used to support different functions in the MIMO antenna-based wireless sensor networks system. As a result, applicant's invention of the low power-efficient operation modes (full operation mode, sleep mode, wake-up mode, and partial operation mode) is used to control different operations within the sensor nodes in the MIMO antenna-based CDMA space-time sensor networks, which is different from the "wake-up mode" with different from a wake-up sensor function in **Breed**'s patent.

In summary, **Monroe**, and **Breed** are arts but they are different from each other. Monroe presented the ground link with on-board security surveillance system for aircraft and other commercial vehicles. The ground link with on-board security surveillance system is used to monitor between the ground and the transport, between the transport and ground or terminal support vehicles and to track collision avoidance as well as navigational information for flight plans while Breed presented the low power remote asset monitoring that is used to monitor transportation assets of shipping containers with a lower power requirement. They are all single-antenna operation and do not require tiny sensor node architecture. Applicant's invention is the MIMO antenna-based wireless sensor networks communication. It can be used for frequency selection, carrier frequency generation, interleaver, error coding, channel estimate, signal detection, modulation, source data encryption and provides methods to overcome signal multipath propagation effects. In addition, it has a very tiny architecture for each of sensor nodes, including low-power, low-cost communication transceiver, sensing, A/D and D/A converters, computing processing units and low power-efficient operation modes. Each of sensor nodes is equipped with M antennas to enhance capacity performance and increase a transmission range. Applicant's invention also allows deploying a larger of size sensor nodes, such as 1000, or even more individual sensor nodes in potentially hostile and militarily sensitive environments. Therefore, application's invention of the MIMO antenna-based wireless sensor networks communications is fundamentally different from the Monroe, and Breed's systems or any combination thereof. As a result, it is impossible and unobvious to one having ordinary skill in the art to develop the MIMO antenna-based

wireless sensor networks communications even given Monroe, and Breed's prior-art references.

Monroe, and Breed Do Not Contain Any Justification To Support Individual or Their Combination, Much Less In The Manner Proposed

With regard to the individual invention of Monroe, and Breed, it has been shown that there are fundamentally differences between applicant's invention and the individual invention of Monroe, and Breed as applicant discussed above. Therefore, it is invalid to use any prior-art references to reject applicant's invention under 35 U.S.C. 103(a).

With regard to any combination of Monroe, and Breed's prior art references, it is well known that in order to for any prior-art references themselves to be validly combined for use in a prior-art rejection of the Section 103, the reference themselves (or some other prior art) must suggest that they be combined, e.g., as was stated in In re Sernaker, 217 U.S.P.Q. 1.6 (C.A.F.C. 1983):

“Prior art references in combination do not make an invention obvious unless something in the prior art references would suggest the advantage to be derived from combining their teaching.”

That the suggestion to combine the references should not come from applicant was forcefully stated on Orthopedic Equipment Co. v. United States, 217 U.S.P.Q. 193, 199 (CAFC 1983):

“It is wrong to use the patent in suit [here the patent application] as a guide through the mazc of prior art references, combining the right references in the right way to achieve the result of the claims in suit [here the claims pending]. Monday morning quarterbacking is quite improper when resolving the question of nonobviousness in a court of law [here the PTO].”

As was further stated in Uniroyal, Inc. v. Rudkin-Wiley Corp., 5 U.S.P.Q.2d 1434 (C.A.F.C. 1988):

"[w]here prior-art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself. . . . Something in the prior art must suggest the desirability and thus the obviousness of making the combination." [Emphasis supplied]

In line with these decisions, recently the Board stated in Ex parte Levengood, 28 U.S.P.Q.2d 1300 (P.T.O.B.A.&I., 1993):

"In order to establish a prima facie case of obviousness, it is necessary for the examiner to present evidence, preferably in the form of some teaching, suggestion, incentive or inference in the applied prior art, or in the form of generally available knowledge, that one having ordinary skill in the art would have been led to combine the relevant teachings of the applied references in the proposed manner to arrive at the claimed invention, . . . That which is within the capabilities of one skilled in the art is not synonymous with obviousness. . . . That one can reconstruct and/or explain the theoretical mechanism of an invention by means of logic and sound scientific reasoning does not afford the basis for an obviousness conclusion unless that logic and reasoning also supplies sufficient impetus to have led one of ordinary skill in the art to combine the teachings of the references to make the claimed invention . . . Our reviewing courts have often advised the Patent and Trademark Office that it can satisfy the burden of establishing a prima facie case of obviousness only by showing some objective teaching in either the prior art, or knowledge generally available to one of ordinary skill in the art, that "would lead" that individual 'to combine the relevant teachings of the references.' . . . Accordingly, an examiner cannot establish obviousness by locating references which describe various aspects of a patent applicant's invention without also providing evidence of the motivating force which would impel one skilled in the art to do what the patent applicant has done."

In the present case, there is no reason given in the Office Action on December 13, 2005, to support the proposed combination, other than the statements "It would have been obvious at the time the invention was made to a person having ordinary skill in the art to include a sleep mode, a wake-up mode, a partial operation mode to the system of Monroe as taught by Breed for the purpose of saving power supply." However, the fact that all of the prior-art references either in individual or any combination form is not sufficient to gratuitously and selectively substitute parts of one reference for a part of another reference in order to meet applicant's novel claims because there are fundamental differences between the applicant's invention of the MIMO antenna-base wireless sensor networks communication system and Monroe's ground link with on-board security surveillance system for aircraft and other commercial vehicles, and Breed's low power remote asset monitoring as well as any combination of Monroe, and Breed as applicant discussed above.

Thus, applicant submits that the fact that the MIMO wireless sensor networks communications produces advantages militates in favor of applicant because it proves that the present invention produces new and unexpected results and hence is unobvious.

As stated in the above Levengood case again:

"That one can reconstruct and/or explain the theoretical mechanism of an invention by means of logic and sound scientific reasoning does not afford the basis for an obviousness conclusion unless that logic and reasoning also supplies sufficient impetus to have led one of ordinary skill in the art to combine the teachings of the references to make the claimed invention."

Therefore, applicant submits that individual or any combination form of Monroe, and Breed is not legally justified and is therefore improper. Thus, applicant submits that the rejection on these prior-art references is also improper and should be withdrawn.

Even If Monroe, and Breed Were To Be Combined In The Manner Proposed, The Proposed Combination Would Not Show All The Novel Physical Feature Of Claim

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However, even if any combination of Monroe, and Breed were legally justified, claim 36 would still have novel and unobvious physical features over the proposed combination. In other words, applicant's invention, as defined by claim 36, comprises much more than merely substitutes a plurality of templates to one template. Furthermore, there are fundamentally differences between applicant's invention of the physical feature structure and expected results, and any combination of Monroe, and Breed. It is also clear that applicant's invention has novel and unobvious physical features over any prior-art references.

Thus, applicant submits that the present invention of the MIMO wireless networks communications is much more than merely substituting a plurality of templates for one template and that claim 36 clearly recites novel physical subject matter, which distinguishes over individual or any possible combination of Monroe, and Breed.

The Novel Physical Features Of Claim 36 Produce New And Unexpected Results And Hence Are Unobvious And Patentable Over These References Under Section 103.

Applicant also submits that the novel physical features of claim 36 is unobvious and hence patentable under Section 103 since it produces new and unexpected results over Monroe, and Breed or any combination thereof.

These new and unexpected results are the ability of applicant's invention of the MIMO wireless networks communication system for communicating the transmitted signals between a large size of tiny sensor nodes and sensor basestations existed in any selected frequency bands under special situations, such as hostile, battlefield, and militarily sensitive environments, with jam-resistances and multipath propagation effects, and operation in an unattended mode with limited power energy. Applicant's invention of the MIMO wireless sensor networks communication system therefore is a novel and vastly superior to that of either Monroe, and Breed or any possible combination thereof.

The novel physical features of applicant's invention of the MIMO wireless sensor networks communication system that affects these differences are, as stated, clearly recited in the claim 36.

The Dependent Claims Are A Fortiori Patentable Over Monroe, and Breed

The new dependent claims from 37 to 43 incorporate all the subject matter of the new independent claim 36 and add additional subject matter that makes them a fortiori and independently patentable over these prior-art references. Accordingly, applicant submits that the new dependent claims are a fortiori patentable and should also be allowed.

Conclusion

For all the reasons given above, applicant respectfully submits that the specification and claims are new in proper form, and that the claims all define patentable over the prior-art references. Therefore, applicant submits that this application is now in full condition for allowance, which action applicant respectfully solicits.

Conditional Request For Constructive Assistance

Applicant has amended the specification and the claims of this application so that they are proper, definite, and define novel physical feature structure, which is also unobvious. Therefore, this application is submitted that patentable subject matter is clearly present. If, for any reason this application is not believed to be in full condition for allowance, the applicant respectfully requests the constructive assistance and suggestions of the Examiner pursuant to M.P.E.P. Section 2173.02 and Section 707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Very respectfully,



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Date: February 28, 2006

Inventor's Signature: George J. Miao